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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/534,827	03/23/2000	Krzysztof Matyjaszewski	00093	9987

7590 09/11/2008
Christine R Ethridge
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Pittsburgh, PA 15222-2312

EXAMINER

CHEUNG, WILLIAM K

ART UNIT	PAPER NUMBER
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1796

MAIL DATE	DELIVERY MODE
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09/11/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 09/534,827	Applicant(s) MATYJASZEWSKI ET AL.	
	Examiner WILLIAM K. CHEUNG	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 86-88,90-162,224-227,270-272 and 287 is/are pending in the application.
- 4a) Of the above claim(s) 140-150,159-162,224-227 and 270 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 86-88,90-139,151-158,271,272 and 287 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Request for Continued Examination

1. The request filed on July 10, 2008 for a Request for Continued Examination (RCE) under 37 CFR 1.53(d) based on parent Application No. 09/534,827 is acceptable and a RCE has been established. An action on the RCE follows.
2. Claims 1-85, 89, 163-223, 228-269, 273-286, 288 have been cancelled. Claims 86-88, 90-162, 224-227, 270-272, 287 are pending. Claims 140-150, 159-162, 224-227, 270 are drawn to non-elected subject matter. Claims 86-88, 90-139, 151-158, 271, 272, 287 are examined with merit.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claim 287 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 287 (line 12), the recitation "the system" is considered indefinite. There is not sufficient antecedent basis for the recitation.

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Claim 287 (line 11-12), the recitation "solvent selected from methanol, ethanol, acetone, and mixture thereof in a concentration of 5 wt% to 10 wt%" is considered indefinite. Are the weight percent based on the polymerization content or based on the catalyst content? Is the recited solvent for the polymers or for the catalyst?

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 86-88, 90-139, 287 are rejected under 35 U.S.C. 102(e) as being anticipated by Matyjaszewski et al. (US 5,945,491 or US 6,111,022), for the reasons adequately set forth from paragraph 5 of the office action of January 11, 2008.

86. (Previously presented) A process for atom transfer radical addition for adding functionality to an oligomer or polymer, comprising:

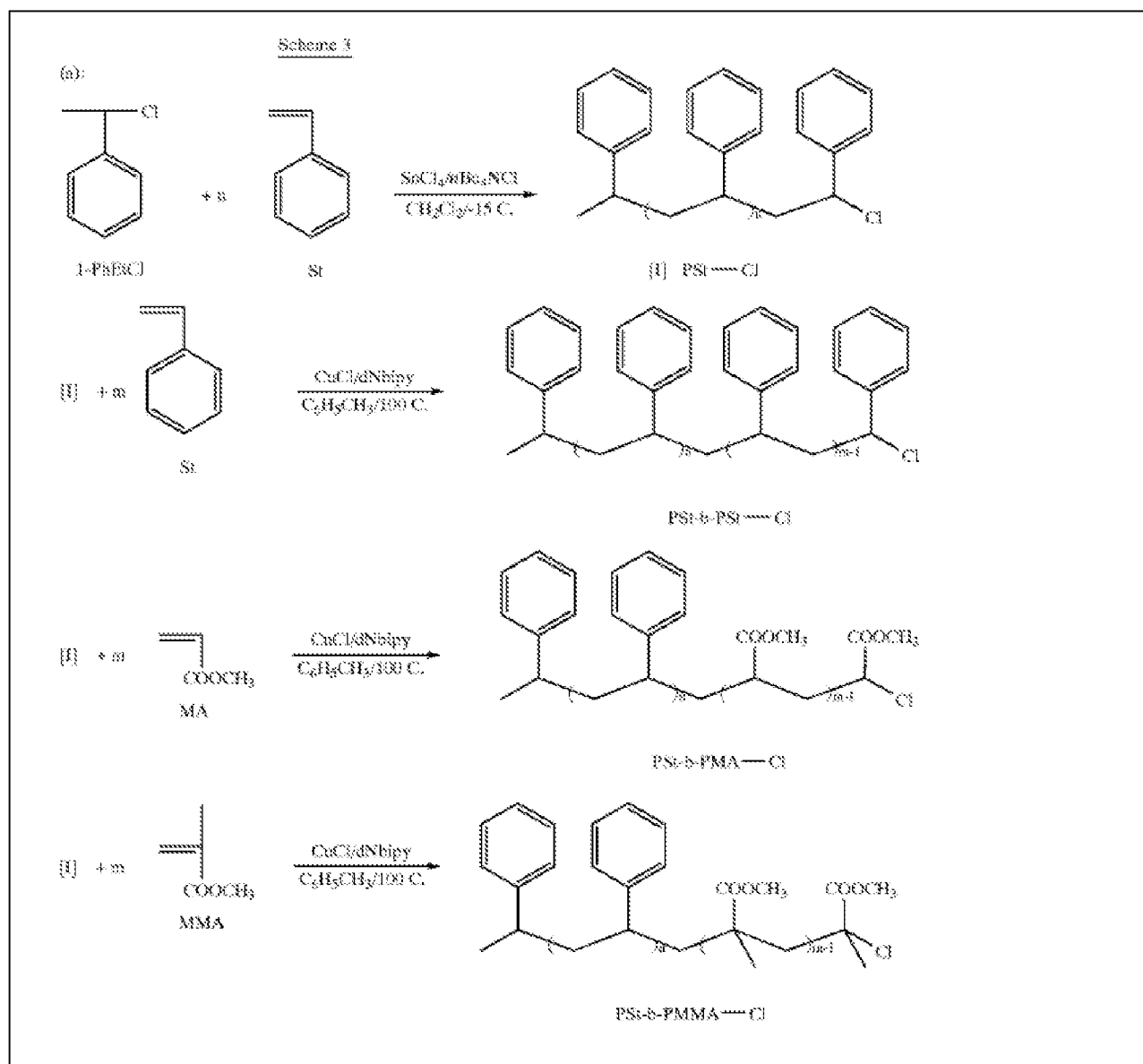
reacting a first oligomer or polymer having a radically transferable atom or group with a second compound having a first desired functional group, the second compound reactive with the first oligomer or polymer after removal of the radically transferable atom or group, wherein the second compound is not a free radically polymerizable monomer, in the presence of a system comprising:
a catalyst which participates in a reversible cycle with the first oligomer or polymer.

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107. (Original) A process for a catalytic atom transfer functionalization of oligo/polymeric materials having one or more radically transferable atom(s) or group(s), comprising the steps:
- providing a polymer having a radically transferable atom or group; and
 - adding a compound containing a α,α -disubstituted olefin group to the polymer in the presence of a transition metal complex capable of undergoing a redox reaction with the radically transferable atom or group, resulting in the addition of the compound containing the α,α -disubstituted olefin group at the site of the radically transferable atom or group and an elimination reaction involving the radically transferable atom or group to form a reactive unsaturated group.
118. (Original) A process for a catalytic atom transfer coupling of polymers comprising:
- providing a first polymer having a first radically transferable atom or group;
 - adding a coupling compound containing one or more α,α -disubstituted olefin group(s) to the first polymer in the presence of a transition metal complex capable of undergoing a redox reaction with the first radically transferable atom or group, resulting in the addition of the coupling compound containing the α,α -disubstituted olefin group at the site of the first radically transferable atom or group and an elimination reaction comprising the radically transferable atom or group to form a reactive double bond; and
 - allowing a second polymer having a second radically transferable atom or group in the presence of the transition metal complex to add to the reactive double bond.

287. (Currently amended) A polymerization process, comprising:
- radically polymerizing one or more radically (co)polymerizable monomers
 - in the presence of a system comprising:
 - an initiator having one or more radically transferable atoms or groups;
 - a transition metal compound which participates in a reversible redox cycle with said initiator or a dormant polymer chain end;
 - a N-, O-, P- or S- containing ligand which coordinates in a σ -bond to the transition metal, any carbon-containing ligand which coordinates in a π -bond to the transition metal or any carbon-containing ligand; and
 - a polar solvent selected from methanol, ethanol, acetone, and mixtures thereof in a concentration of 5 wt% to 10 wt% of the system to form a (co)polymer.

Matyjaszewski et al. (abstract) disclose a process of atom transfer radical polymerization for the synthesis of novel homopolymer or a block or graft copolymer. Matyjaszewski et al. (col. 16, last line of the reaction Scheme 3; col. 17, the first and the last line of the reaction Scheme 3) clearly disclose adding a coupling compound containing one or more α,α -disubstituted olefin group(s) to the first polymer in the presence of a transition metal complex capable of undergoing a redox reaction with the first radically transferable atom or group, resulting in the addition of the coupling compound containing the α,α -disubstituted olefin group at the site of the first radically transferable atom or group and an elimination reaction comprising the radically transferable atom or group to form a reactive double bond.



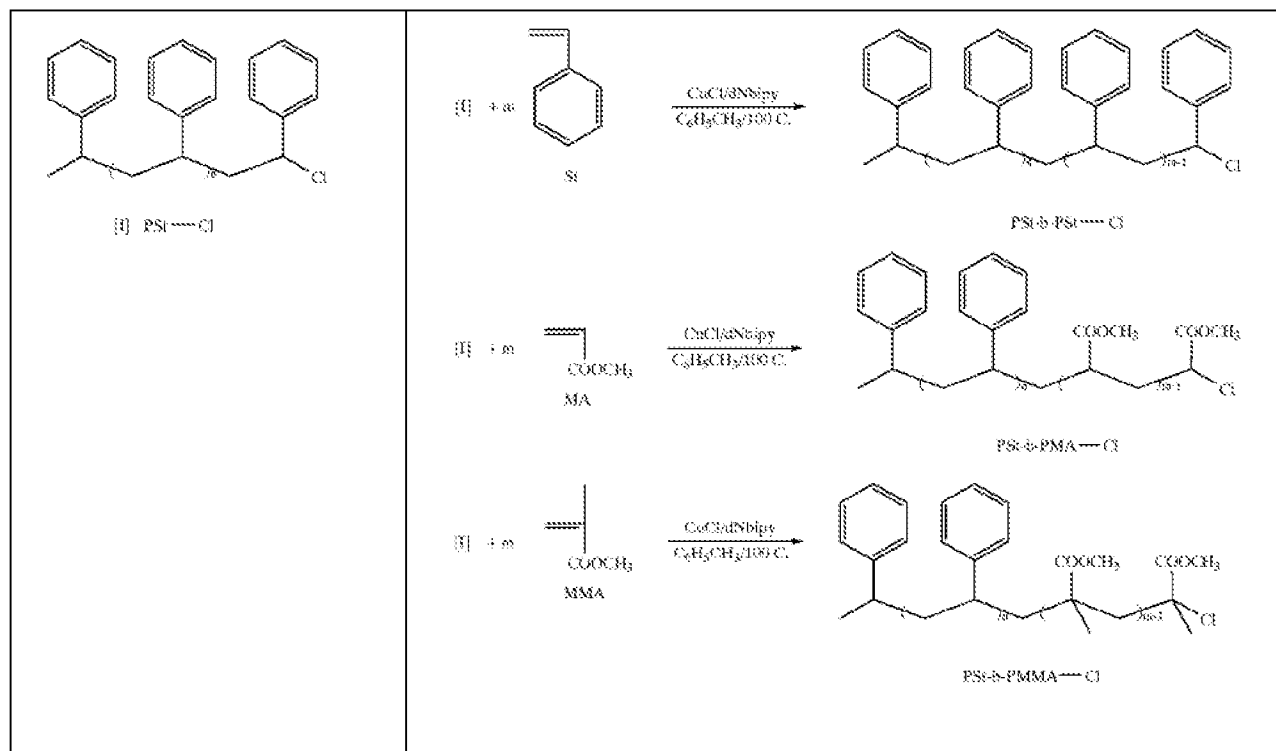
In view of the 112 rejection set forth, the rejection of claim 287 is rejected along with the invention of claim 86.

Applicant's arguments filed July 10, 2008 have been fully considered but they are not persuasive.

First, the examiner is unclear on how the argument filed for claim 86 and its dependent claims when applicants only argue the features of independent claims 107 and 118.

Regarding applicants' argument that Matyjaszewski et al. do not teach a reaction scheme that requires "an elimination reaction involving the radically transferable atom or group to form a reactive unsaturated group" set forth in claims 107 and 118, applicants must recognize that (col. 16, last line of the reaction Scheme 3; col. 17, the first and the last line of the reaction Scheme 3) clearly disclose the reactive species (I) PSt-Cl as indicated below. Regarding the argued "elimination step", in view of the substantial identical catalyst disclosed in Matyjaszewski et al. and as claimed, the examiner has a reasonable basis that the claimed "elimination" mechanism is inherently possessed in Matyjaszewski et al. Applicants must recognize that a prior art is not required to show the reaction mechanism of a reaction that is inherently possessed by the disclosed reaction or polymerization process.

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Applicants argue that the structure V of Matyjaszewski et al. (col. 22, line 36-43) is not a free radically polymerizable monomer such as vinyl alkyl ketone because it is an “inimer”, a molecule that can act both as initiator and a monomer. However, applicants' argument fail to address that issues set forth by the examiner that structure V of Matyjaszewski et al. still include monomers that are not free radically polymerizable.

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Applicants fail to recognize that Matyjaszewski et al. (col. 22, line 34-64) disclose structure (V) that definitively broadly include the a compound that is not a free radically polymerizable monomer, such as vinyl alkyl ketone (col. 31, Table 5). Although applicants argue that the disclosed structure for exp 4 is a typographical error, however, the vinyl alkyl ketone is still taught in Matyjaszewski et al. Further, applicants must also recognize that exp 3 of same Table disclose vinyl ketone. Is that also a typographical error? It is unlikely that two identical typographical errors are found in the same Table.

TABLE 5

Results obtained by transformation of "living" cationic to "living" radical polymerization

Exp	Monomer	Initiating system	Temp °C.	$M_{n,th}$	$M_{n,exp}$	M_w/M_n
1	$CH_2=CH(Ph)$	1-PhEtClSnCl ₄ /nBu ₄ NCl	-15	2080	2100	1.17
2	$CH_2=CH(Ph)$	PSt-Cl/CuCl/dNbipy	100	5100	5080	1.10
3	$CH_2=CH(COMe)$	PSt-Cl/CuCl/bipy	100	6200	6330	1.20
4	$CH_2=CCH_3(COMe)$	PSt-Cl/CuCl/dNbipy	100	10100	11090	1.57

Conditions: Exp. 1 $[St]_0 = 1 \text{ mol/L}$, $[1-PhEtCl]_0 = 5 \times 10^{-2} \text{ mol/L}$, $[1PhEtCl]_0/[SnCl_4]_0/[nBu_4NCl]_0 = 1/5/2$, CH_2Cl_2 solvent, conversion = 98%;
 Exp. 2 $[St]_0 = 3 \text{ mol/L}$, $[PSt-Cl]_0 = 0.1 \text{ mol/L}$, $[PSt-Cl]_0/[CuCl]_0/[dNbipy]_0 = 1/1/2$, $C_6H_5CH_3$ solvent, conversion = 95.5%;
 Exp. 3 $[MA]_0 = 4.76 \text{ mol/L}$, $[PSt-Cl]_0 = 0.1 \text{ mol/L}$, $[PSt-Cl]_0/[CuCl]_0/[dNbipy]_0 = 1/1/2$, $C_6H_5CH_3$ solvent, conversion = 99.5%;
 Exp. 4 $[St]_0 = 8 \text{ mol/L}$, $[PSt-Cl]_0 = 0.1 \text{ mol/L}$, $[PSt-Cl]_0/[CuCl]_0/[dNbipy]_0 = 1/1/2$, $C_6H_5CH_3$ solvent, conversion = 97.5%.

Also, applicants fail to recognize that the claims 107-139, 287, 288 as written do not require the second compound to be not free radically polymerizable.

Applicants must recognize that Matyjaszewski et al. (col. 31, Table 5) in experiment 4 disclose the use of a second compound, apha-methyl vinyl methyl ketone in the disclosed process. Since the examiner can not find any polymer prepared from

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alpha-methyl vinyl methyl ketone in a literature search, the examiner has a reasonable that the alpha-methyl vinyl methyl ketone as disclosed in Matyjaszewski et al. is not a free radically polymerizable monomer. Since the PTO does not have proper means to conduct experiments, the burden of proof is now shifted to applicants to show otherwise. In re Best, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977); In re Fitzgerald, 205 USPQ 594 (CCPA 1980). Since applicants' specification does not define what type of monomers are considered "not free radically polymerizable", the instant rejection is proper and adequate in view of the teachings of Matyjaszewski et al. as set forth above.

8. Claims 151-158, 271-272 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matyjaszewski et al. (US 5,945,491) in view of Patten et al., "Atom Transfer Radical Polymerization and the Synthesis of Polymeric Materials", Advanced Materials 1998, 10 No. 12, page 901-915, for the reasons adequately set forth from paragraph 6 of the office action of January 11, 2008.

151. (Currently amended) A controlled polymerization process, comprising:
adding a core forming compound to an active atom transfer radical polymerization process; and
~~forming a multi-arm star copolymer wherein polymers react~~ reacting polymer chains having a radically transferable atom or group with the core forming compound to form the multi-arm star copolymer.

271. (Previously presented) A controlled polymerization process for the production of telefunctional multi-arm star copolymers, comprising:
polymerizing a free radically (co)polymerizable monomer in the presence of a system comprising:

a telefunctional multi-armed star initiator synthesized from free radically copolymerizable monomers, a first initiator with one radically transferable atom or group, and a divinyl compound in the presence of a transition metal complex.

Matyjaszewski et al. (abstract) disclose a process of atom transfer radical polymerization for the synthesis of novel homopolymer or a block or graft copolymer. Matyjaszewski et al. (col. 16, last line of the reaction Scheme 3; col. 17, the first and the last line of the reaction Scheme 3) clearly disclose adding a coupling compound containing one or more α,α -disubstituted olefin group(s) to the first polymer in the presence of a transition metal complex capable of undergoing a redox reaction with the first radically transferable atom or group, resulting in the addition of the coupling compound containing the α,α -disubstituted olefin group at the site of the first radically transferable atom or group and an elimination reaction comprising the radically transferable atom or group to form a reactive double bond.

Applicants argue that Matyjaszewski et al. are silent on that “the second compound is not a free radically polymerizable monomer”. However, the examiner disagrees because Matyjaszewski et al. (col. 31, Table 5) in experiment 4 disclose the use of a second compound, α -methyl vinyl methyl ketone in the disclosed process. Since the examiner can not find any polymer prepared from α -methyl vinyl methyl ketone in a literature search, the examiner has a reasonable that the α -methyl vinyl methyl ketone as disclosed in Matyjaszewski et al. is not a free radically polymerizable monomer. Since the PTO does not have proper means to conduct experiments, the burden of proof is now shifted to applicants to show otherwise. In re Best, 562 F.2d

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1252, 195 USPQ 430 (CCPA 1977); In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

Since applicants' specification does not define what type of monomers are considered "not free radically polymerizable", the instant rejection is proper and adequate in view of the teachings of Matyjaszewski et al. as set forth above.

The difference between the invention of claims 151-158, 271-272 and Matyjaszewski et al. is that Matyjaszewski et al. are silent on a process comprising a core forming compound or a telefunctional multi-armed star copolymers.

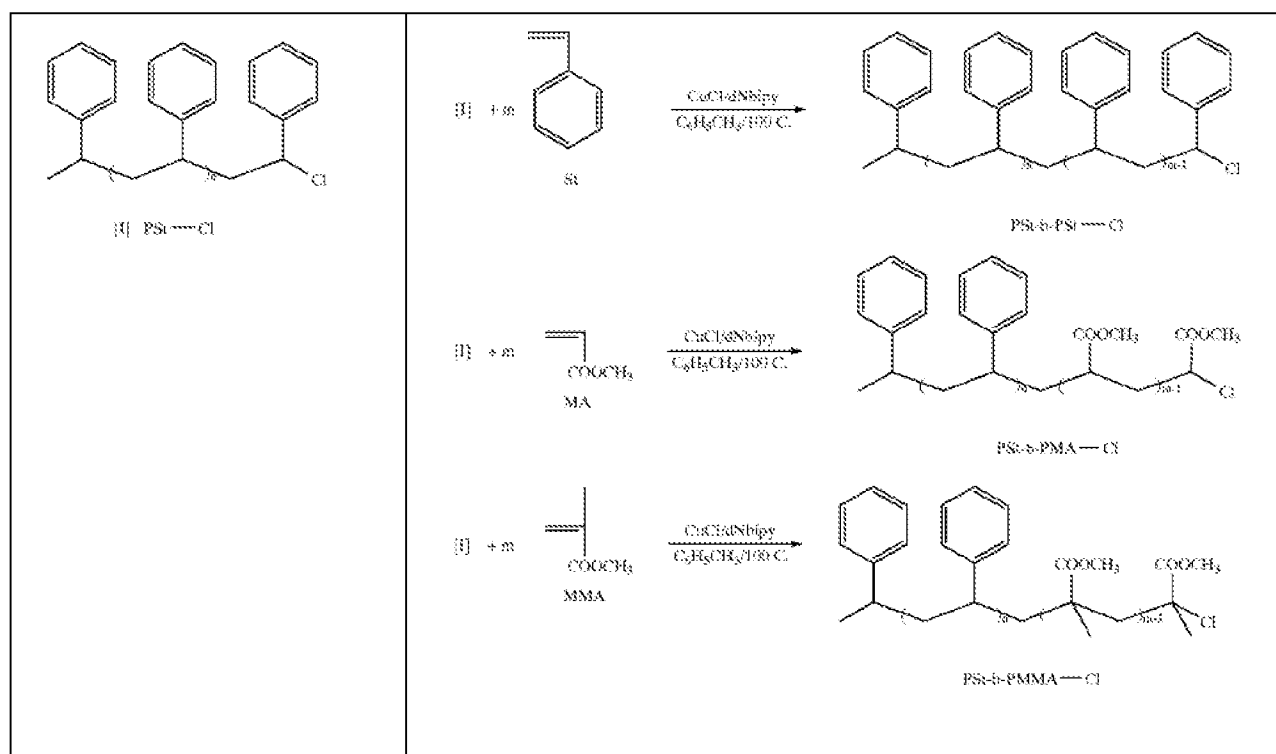
Patten et al. (page 901, Figure 1) disclose that a core forming compound or a telefunctional multi-armed star copolymers can be prepared by atom transfer radical polymerization processes. Therefore, motivated by the expectation of success of preparing a star or a multi-arm structure of Patten et al. (page 901, Figure 1), it would have been obvious to one of ordinary skill in art to incorporate the star or multi-arm structure of Patten et al. to obtain the invention of claims 151-158, 271-272.

Applicant's arguments filed July 10, 2008 have been fully considered but they are not persuasive.

Applicants argue that claims 151-158 and 271-272 relates to an "arm-first" approach to the synthesis of a multi-arm star copolymer, whereas Matyjaszewski et al. disclose a step wise approach to star copolymers. Applicants argue that the "arm-first" approach is clearly supported by the amended claim 151 which recites "reacting polymer chains having a radically transferable atom or group with the core forming compound to form the multi-arm star copolymer. However, applicants fail to recognize

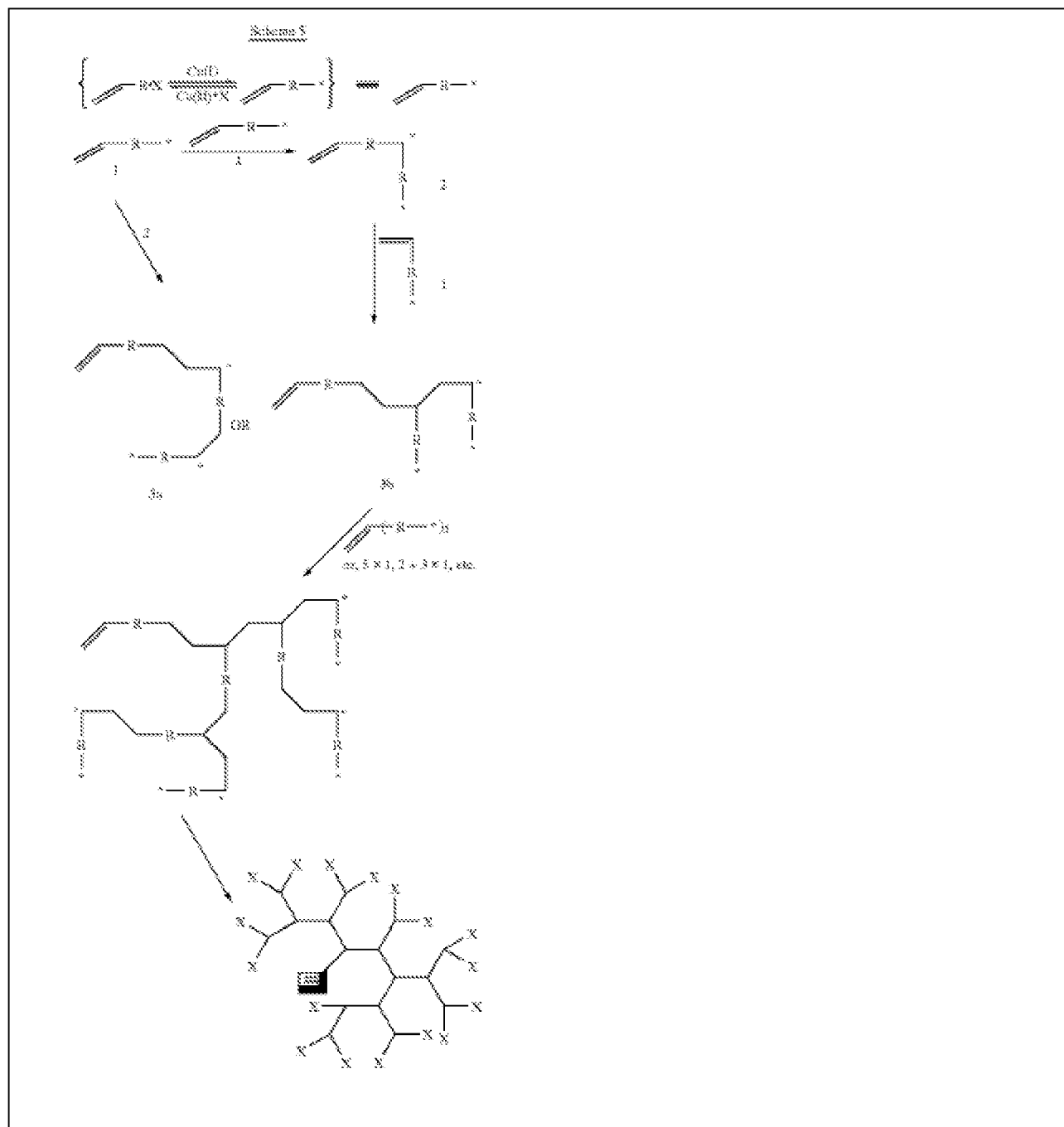
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that the disclosed structure [I] is the polymer chain having a radically transferable atom or group, and the ethylenically unsaturated compounds disclosed can be considered the argued "core forming compound".



Regarding the claimed "multi-arm star copolymer", Matyjaszewski et al. (col. 23, scheme 5) clearly disclose the "multi-arm star copolymer" as claimed.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William K. Cheung whose telephone number is (571) 272-1097. The examiner can normally be reached on Monday-Friday 9:00AM to 2:00PM; 4:00PM to 8:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David WU can be reached on (571) 272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/William K Cheung/
Primary Examiner, Art Unit 1796

William K. Cheung, Ph. D.

Primary Examiner

September 4, 2008

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